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Two new species of *Pergalumna* (Acari, Oribatida, Galumnidae) from Costa Rica, including a key to all species of the genus from the Neotropical region

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Abstract

Two new species of oribatid mites of the genus *Pergalumna* (Oribatida, Galumnidae), *P. elongatiporosa* **sp. n.** and *P. striatiprodorsum* **sp. n.**, are described from leaf litter of a secondary forest in Costa Rica. *Pergalumna elongatiporosa* **sp. n.** is most similar morphologically to *P. horvathorum* P. Balogh, 1997 and *P. sura* P. Balogh, 1997, however, it differs from both by the body size, body surface ornamentation and morphology of notogastral porose areas *A1* and *A3*. *Pergalumna striatiprodorsum* **sp. n.** is most similar morphologically to *P. hawaiiensis hawaiiensis* (Jacot, 1934) and *P. strigulata* Mahunka, 1978, however, it differs from *P. hawaiiensis* by the length of interlamellar setae and surface ornamentation of the prodorsum; from *P. strigulata* by the surface of ornamentation of the notogaster, length of interlamellar setae and morphology of bothridial setae. An identification key to known species of *Pergalumna* from the Neotropical region is given.

Keywords

Oribatid mites, new species, *Pergalumna*, key, Costa Rica, Neotropical region

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Introduction

Pergalumna is a large genus that was proposed by Grandjean (1936) with *Oribata nervosa* Berlese, 1914 as type species. Currently, it comprises more than 130 species having a cosmopolitan distribution collectively (Subías 2004, updated 2014). The generic characters of the genus are summarized by Ermilov et al. (2013a), an identification key to some species has been presented by Balogh and Balogh (2002).

In the course of taxonomic identification of Costa Rican oribatid mites collected in 2013, we found two new species of the genus *Pergalumna*. The main goal of our paper is to describe these species. Earlier, only three species were known from Costa Rica (P. Balogh 1997; Schatz 2006, 2007; Ermilov et al. 2014): *P. horvathorum* P. Balogh, 1997, *P. silvatica* Hammer, 1961 and *P. sura* P. Balogh, 1997. An identification key to known species of *Pergalumna* from the Neotropical region is given in the present work.

Materials and methods

Three specimens (holotype: male; two paratypes: one male and one female) of *Pergalumna elongatiporosa* sp. n. and nine specimens (holotype: female; eight paratypes: five males and three females) of *P. striatiprodorsum* sp. n. are from: Costa Rica, 9°50'24"N, 83°53'17"W, Cartago, Dulce Nombre, Paraíso, Jardín Botánico Lankester, 1400 m a.s.l., in leaf litter in secondary forest, 14.V.2013, collected by O. Alvarado-Rodríguez and A.P. Retana-Salazar.

Holotypes and paratypes were mounted in lactic acid on temporary cavity slides for measurement and illustration. The body length was measured in lateral view, from the tip of the rostrum to the posterior edge of the ventral plate. The notogastral width refers to the maximum width in dorsal aspect. Lengths of body setae were measured in lateral aspect. All body measurements are presented in micrometers. Formulae for leg setation are given in parentheses according to the sequence trochanter–femur–genu–tibia–tarsus (famulus included). Formulae for leg solenidia are given in square brackets according to the sequence genu–tibia–tarsus. General terminology used in this paper follows that of Grandjean (summarized by Norton and Behan-Pelletier 2009).

Taxonomy

***Pergalumna elongatiporosa* sp. n.**
http://zoobank.org/E008B3A2-4238-4C4E-B918-8B9E10E48686
Figs 1–4

Diagnosis. Body size: 332–352 × 246–266. Body surface and pteromorphs microgranulate. Rostral, lamellar and interlamellar setae well developed, barbed. Bothridial setae setiform, ciliate unilaterally. Anterior notogastral margin not developed. Three

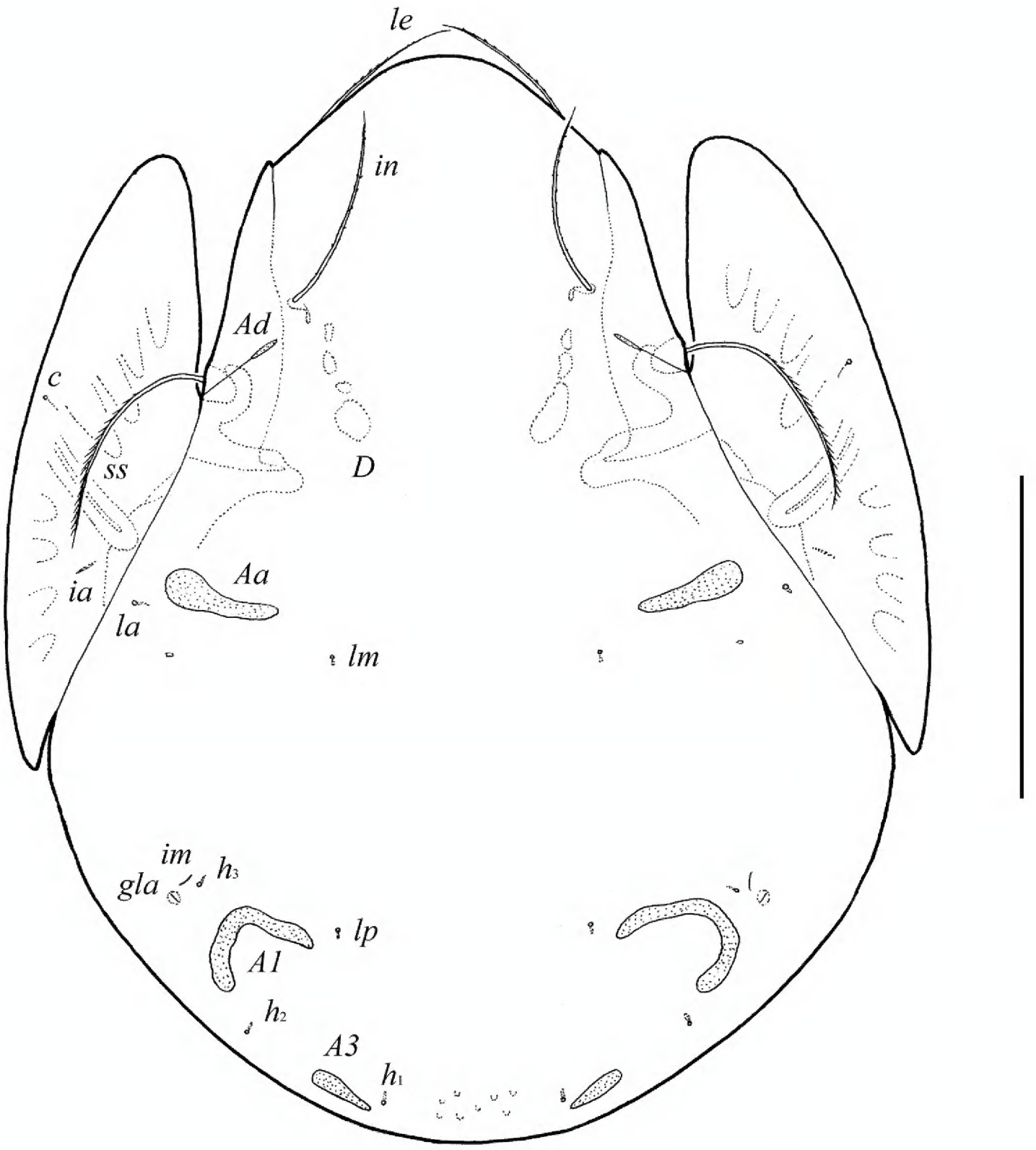


Figure 1. *Pergalumna elongatiporosa* sp. n.: dorsal view. Scale bar 100 μm.

pairs of porose areas: *Aa* and *A3* elongate triangular, *A1* long, band-shaped, specifically curving, *Aa* located between notogastral alveoli *la* and *lm*. Median pore and postanal porose area absent. Aggenital and ano-adanal setae simple, short. Solenidion φ on tibia IV inserted in proximal part.

Description. *Measurements*. Body length: 332 (holotype, male), 340–352 (two paratypes: one male and one female); notogaster width: 246 (holotype), 246–266 (two paratypes).

Integument. Body color brown to black-brown. Body surface and pteromorphs with dense microgranules (their diameter up to 2). Pteromorphs with poorly visible wrinkles.

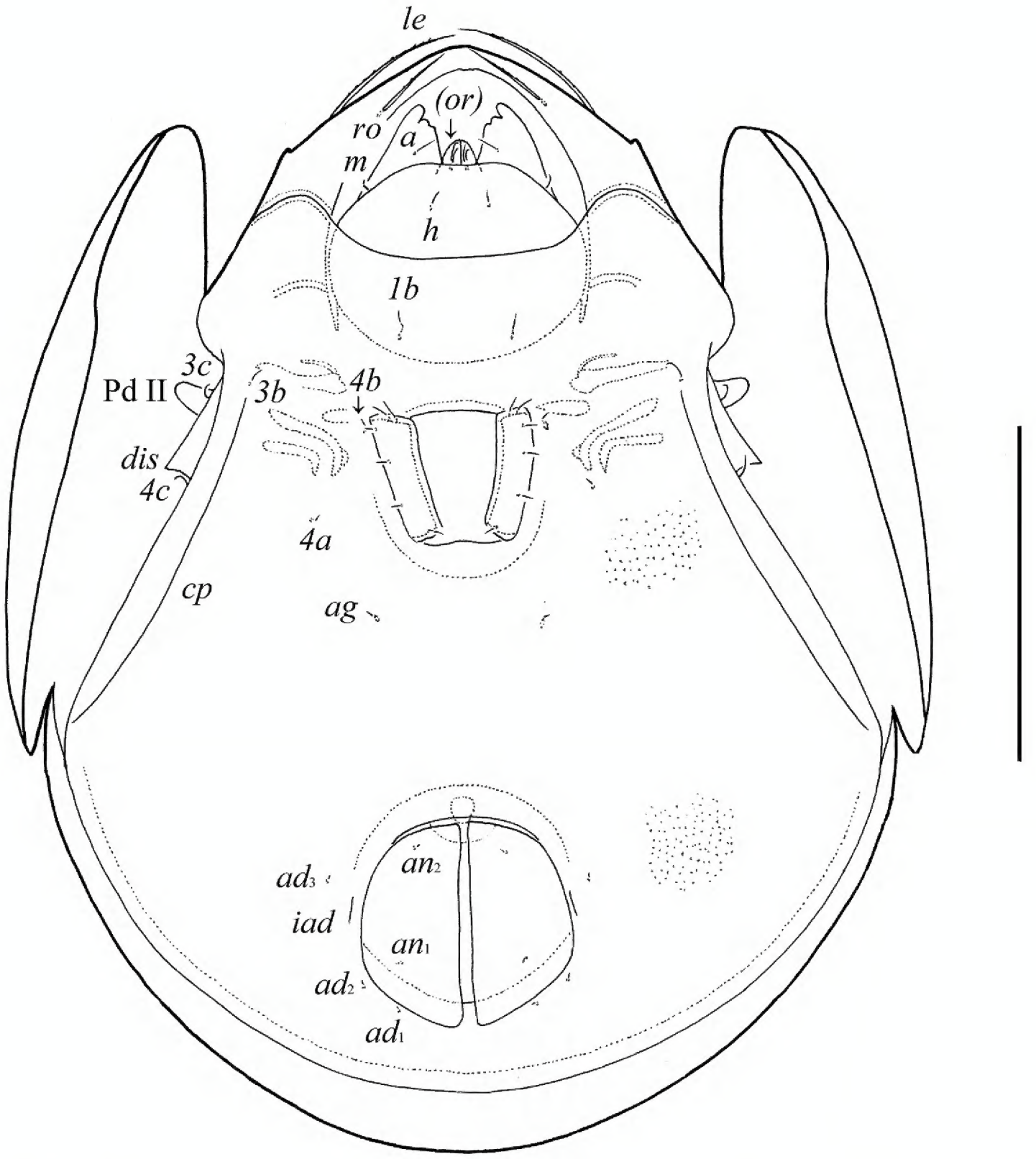


Figure 2. *Pergalumna elongatiporosa* sp. n.: ventral view (legs not illustrated). Scale bar 100 μm.

Prodorsum. Rostrum broadly rounded. Rostral (*ro*, 24–28), lamellar (*le*, 49–53) and interlamellar (*in*, 69–77) setae setiform, barbed. Bothridial setae (*ss*, 90–102) setiform, densely ciliate unilaterally. Exobothridial setae absent. Lamellar and sublamellar lines distinct, parallel, curving backwards. Insertions of lamellar setae distanced from the lamellar lines. Porose areas *Ad* small, elongate oval (8–12 × 2–4), located lateroposteriorly to interlamellar setae.

Notogaster. Anterior notogastral margin not developed. Dorsophragmata (*D*) long. Notogastral setae represented by 10 pairs of alveoli. Three pairs of porose areas well

visible, with distinct margins: *Aa* weakly triangular, transversally oriented (36–57 × 8–12), *A1* long, band-shaped, specifically curving (57–69 × 8–13), *A3* elongate, narrowly triangular (28–32 × 8–16). Porose areas *Aa* located between notogastral alveoli *la* and *lm*. Median pore absent. All lyrifissures distinct; *im* and opisthonotal gland openings (*gla*) located latero-anteriorly to *A1*.

Gnathosoma. Morphology of subcapitulum, palps and chelicerae typical for *Pergalumna* (see Engelbrecht 1972; Ermilov et al. 2010; Ermilov and Anichkin 2011). Subcapitulum longer than wide (90–94 × 77–86). Subcapitular setae setiform, slightly barbed; *a* (14–16) longer than *m* (10) and *h* (8). Two pairs of adoral setae (or_1, or_2, 8) setiform, hook-like distally, barbed. Palps (73) with setation 0–2–1–3–9(+ω). Solenidion attached to eupathidium, both located on dorsal tubercle. Chelicerae (118–123) with two setiform, barbed setae; *cha* (28–32) longer than *chb* (20). Trägårdh's organ distinct.

Epimeral and lateral podosomal regions. Apodemes 1, 2, sejugal and 3 well visible. Six pairs of setiform epimeral setae observed; setal formula: 1–0–2–3. Setae *4a*, *4b* (4) thin, smooth, shorter than *1b*, *3b*, *3c*, *4c* (8–10), slightly barbed. Pedotecta II (Pd II) scale-like, rounded in ventral view. Discidia (*dis*) pointly triangular. Circumpedal carinae (*cp*) distinct, directed posterior of setae *3b*.

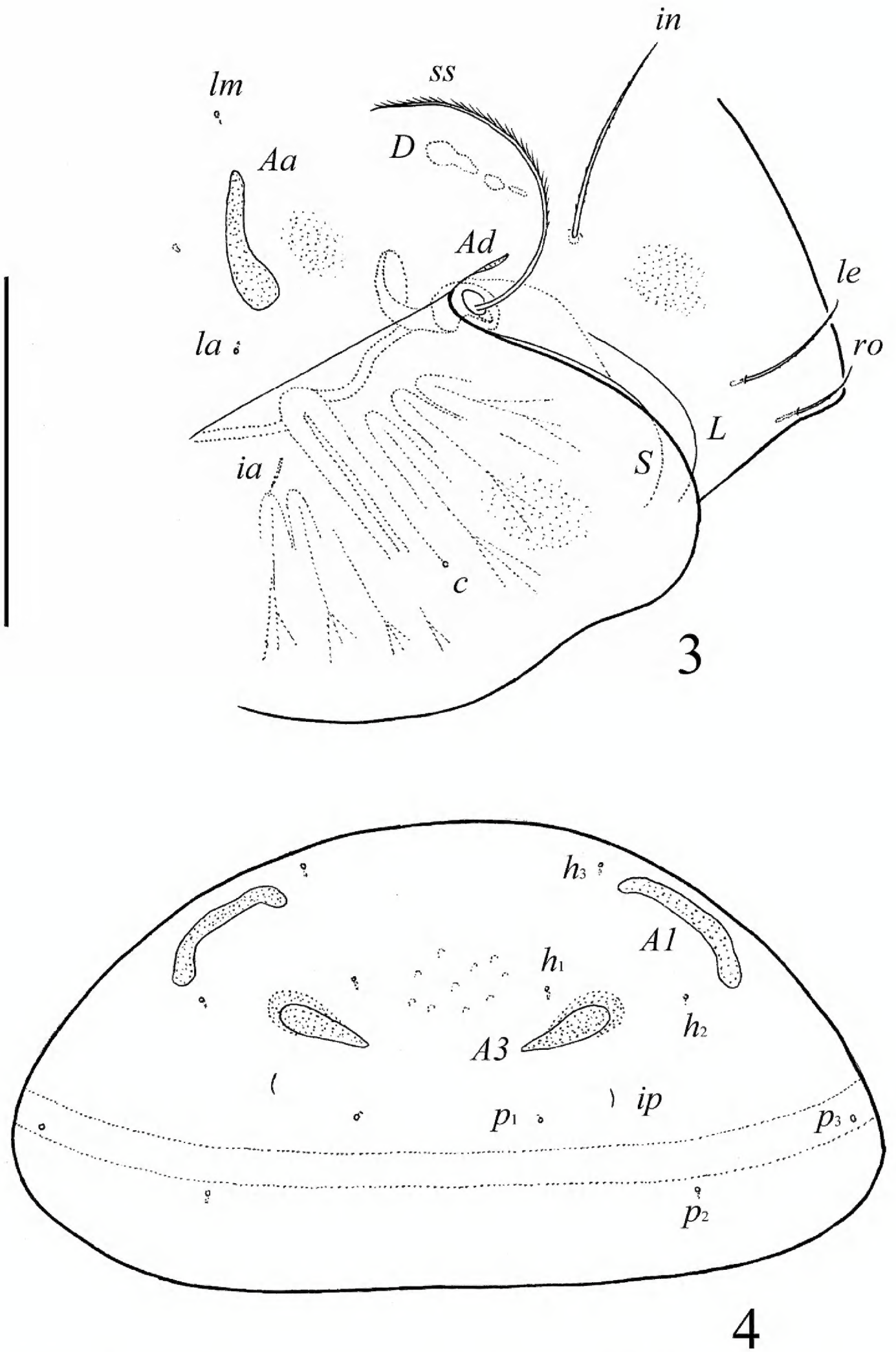
Anogenital region. Six pairs of genital (g_1, g_2, 8; g_3–g_6, 4), one pair of aggenital (*ag*, 4), two pairs of anal (an_1, an_2, 4) and three pairs of adanal (ad_1–ad_3, 4) setae minute, thin, smooth. Anterior parts of genital plates with two setae. Adanal setae ad_3 inserted laterally or antero-laterally to lyrifissures *iad*. Postanal porose area absent.

Legs. Morphology of leg segments, setae and solenidia typical for *Pergalumna* (see Engelbrecht 1972; Ermilov et al. 2010; Ermilov and Anichkin 2011). Formulae of leg setation and solenidia: I (1–4–3–4–20) [1–2–2], II (1–4–3–4–15) [1–1–2], III (1–2–1–3–15) [1–1–0], IV (1–2–2–3–12) [0–1–0]; homology of setae and solenidia indicated in Table 1. Solenidion φ on tibia IV inserted in proximal part.

Type deposition. The holotype is deposited in the Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia; one paratype is deposited in the collection of the Tyumen State University Museum of Zoology, Tyumen, Russia; one paratype is deposited in the collection of the Centro de Investigación en Estructuras, Microscópicas (CIEMIC), Ciudad de la Investigación, Universidad de Costa Rica, San José, Costa Rica.

Etymology. This specific name "*elongatiporosa*" refers to the elongate porose areas *A1*.

Remarks. In having the setiform bothridial setae, well developed interlamellar setae, absence of anterior notogastral margin and presence of three pairs of porose areas (*Aa* transversally elongated), *Pergalumna elongatiporosa* sp. n. is most similar to *P. horvathorum* P. Balogh, 1997 and *P. sura* P. Balogh, 1997 (see also Ermilov et al. 2014) from the Neotropical region. However, it differs from both by the smaller body size (332–352 × 246–266 versus 394–410 × 295 in *P. horvathorum* and 443–498 × 315–377 in *P. sura*), microgranulate body surface (versus smooth in *P. horvathorum* and *P. sura*), band-shaped, specifically curving porose areas *A1* (versus elongate oval in *P. horvathorum* and triangular in *P. sura*) and elongate triangular porose areas *A3* (versus absent in *P. horvathorum* and oval in *P. sura*).



Figures 3–4. *Pergalumna elongatiporosa* sp. n.: **3** dorso-lateral view of prodorsum and anterior part of notogaster and pteromorph (gnathosoma and legs not illustrated) **4** posterior view of notogaster. Scale bars 100 μm.

Table 1. Leg setation and solenidia of *Pergalumna elongatiporosa* sp. n. (same data for *P. striatiprodorsum* sp. n.)

Leg	Trochanter	Femur	Genu	Tibia	Tarsus
I	*v'*	*d, (l), bv"*	*(l), v', σ*	*(l), (v), φ_1, φ_2*	*(ft), (tc), (it), (p), (u), (a), s, (pv), v', (pl), l"*, ε, ω_1, ω_2
II	*v'*	*d, (l), bv"*	*(l), v', σ*	*(l), (v), φ*	*(ft), (tc), (it), (p), (u), (a), s, (pv)*, ω_1, ω_2
III	*v'*	*d, ev'*	*l', σ*	*l', (v), φ*	*(ft), (tc), (it), (p), (u), (a), s, (pv)*
IV	*v'*	*d, ev'*	*d, l'*	*l', (v), φ*	*ft", (tc), (p), (u), (a), s, (pv)*

Roman letters refer to normal setae (ε to famulus), Greek letters to solenidia. Single prime (') marks setae on anterior and double prime (") setae on posterior side of the given leg segment. Parentheses refer to a pair of setae.

Pergalumna striatiprodorsum sp. n.

http://zoobank.org/2DBFC49F-0502-4A55-AC59-6E1E45C8358C

Figs 5–8

Diagnosis. Body size: 630–697 × 448–514. Body surface and pteromorphs microgranulate; surface of prodorsum with numerous longitudinal stria. Rostral, lamellar and bothridial setae of medium size, setiform, barbed; interlamellar setae short, slightly thickened, barbed. Anterior notogastral margin not developed. Three pairs of porose areas oval; *Aa* located between notogastral alveoli *la* and *lm*, close to *lm*. Median pore absent. Aggenital and ano-adanal setae simple, short. Postanal porose area present, elongated.

Description. *Measurements*. Body length: 697 (holotype, female), 630–697 (eight paratypes: five males and three females); notogaster width: 514 (holotype), 448–514 (eight paratypes).

Integument. Body color brown to black-brown. Body surface, pteromorphs and subcapitular mentum with dense microgranules (their diameter up to 2). Surface of prodorsum with numerous longitudinal stria. Pteromorphs with poorly visible wrinkles.

Prodorsum. Rostrum broadly rounded. Rostral (41–53), lamellar (57–69) and bothridial (106–114) setae setiform, barbed. Interlamellar setae short (12–16), setiform, slightly thickened, barbed. Exobothridial setae absent. Lamellar and sublamellar lines distinct, parallel, curving backwards. Insertions of lamellar setae distanced from the lamellar lines. Porose areas *Ad* elongate oval (20–28 × 4–8), located latero-posteriorly to interlamellar setae.

Notogaster. Anterior notogastral margin not developed. Dorsophragmata of medium size. Notogastral setae represented by 10 pairs of alveoli. Three pairs of porose areas well visible, with distinct margins: *Aa* rounded (14–16) or oval, weakly transversally oriented (14–20 × 12–16), *A1* oval, weakly elongated diagonally (24–41 × 12–20), *A3* rounded (12–16) or oval (12–16 × 10–12). Porose areas *Aa* located between notogastral alveoli *la* and *lm*, but clearly closer to *lm*. Median pore absent. All lyrifissures distinct; *im* located latero-anteriorly to *A1*. Opisthonotal gland openings located laterally to *A1*.

Gnathosoma. Morphology of subcapitulum, palps and chelicerae typical for *Pergalumna* (see Engelbrecht 1972; Ermilov et al. 2010; Ermilov and Anichkin 2011).

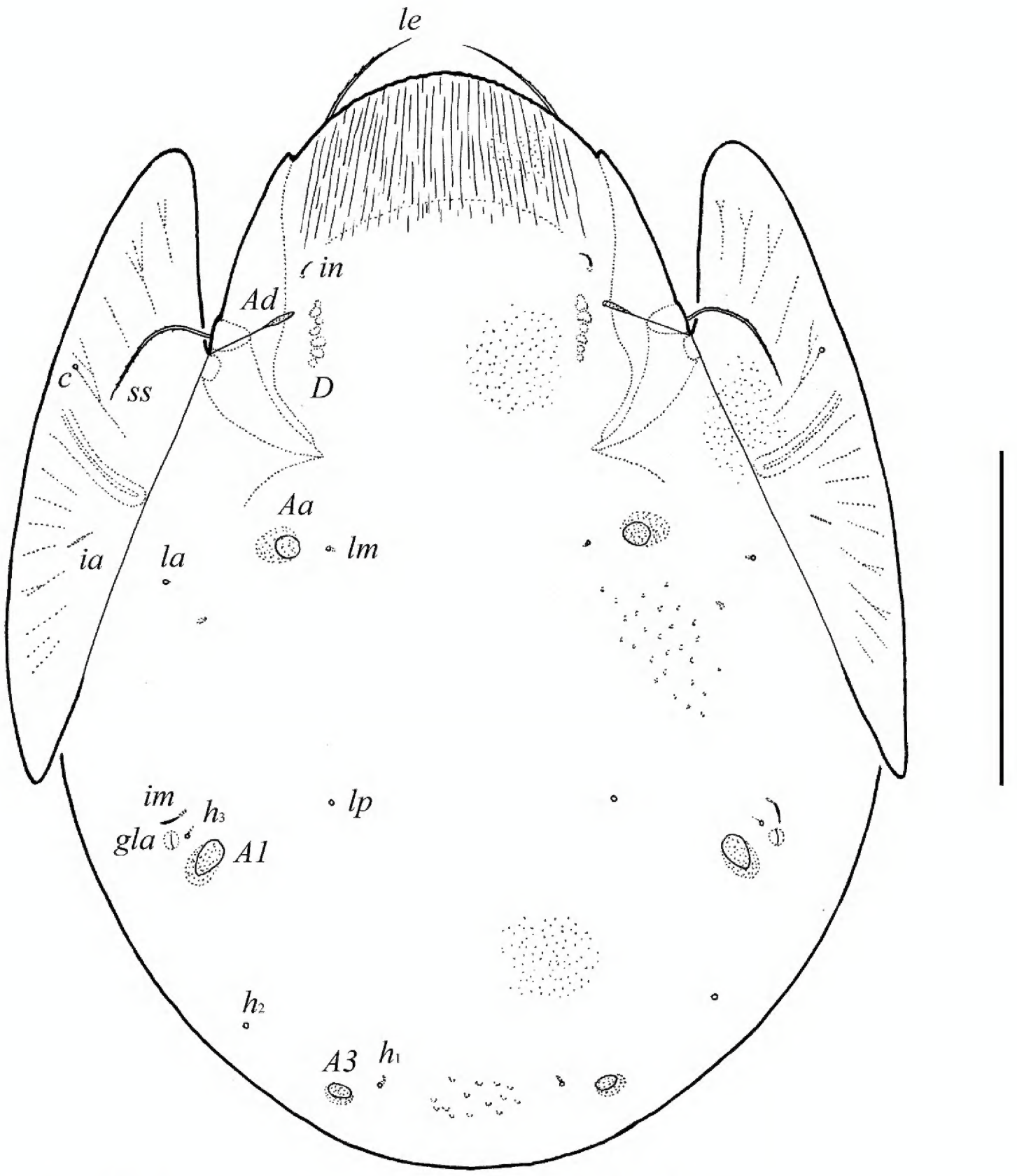


Figure 5. *Pergalumna striatiprodorsum* sp. n.: dorsal view. Scale bar 200 μm.

Subcapitulum longer than wide (155–159 × 131–143). Subcapitular setae setiform, slightly barbed; *a* (24) longer than *m* (16) and *h* (14–16). Two pairs of adoral setae (12–14) setiform, hook-like distally, barbed. Palps (123–127) with setation 0–2–1–3–9(+ω). Solenidion attached to eupathidium, both located on dorsal tubercle. Chelicerae (196–205) with two setiform, barbed setae; *cha* (53) longer than *chb* (32–36). Trägårdh's organ distinct.

Epimeral and lateral podosomal regions. Apodemes 1, 2, sejugal and 3 well visible. Six pairs of setiform epimeral setae observed; setal formula: 1–0–2–3. Setae *4a*, *4b*

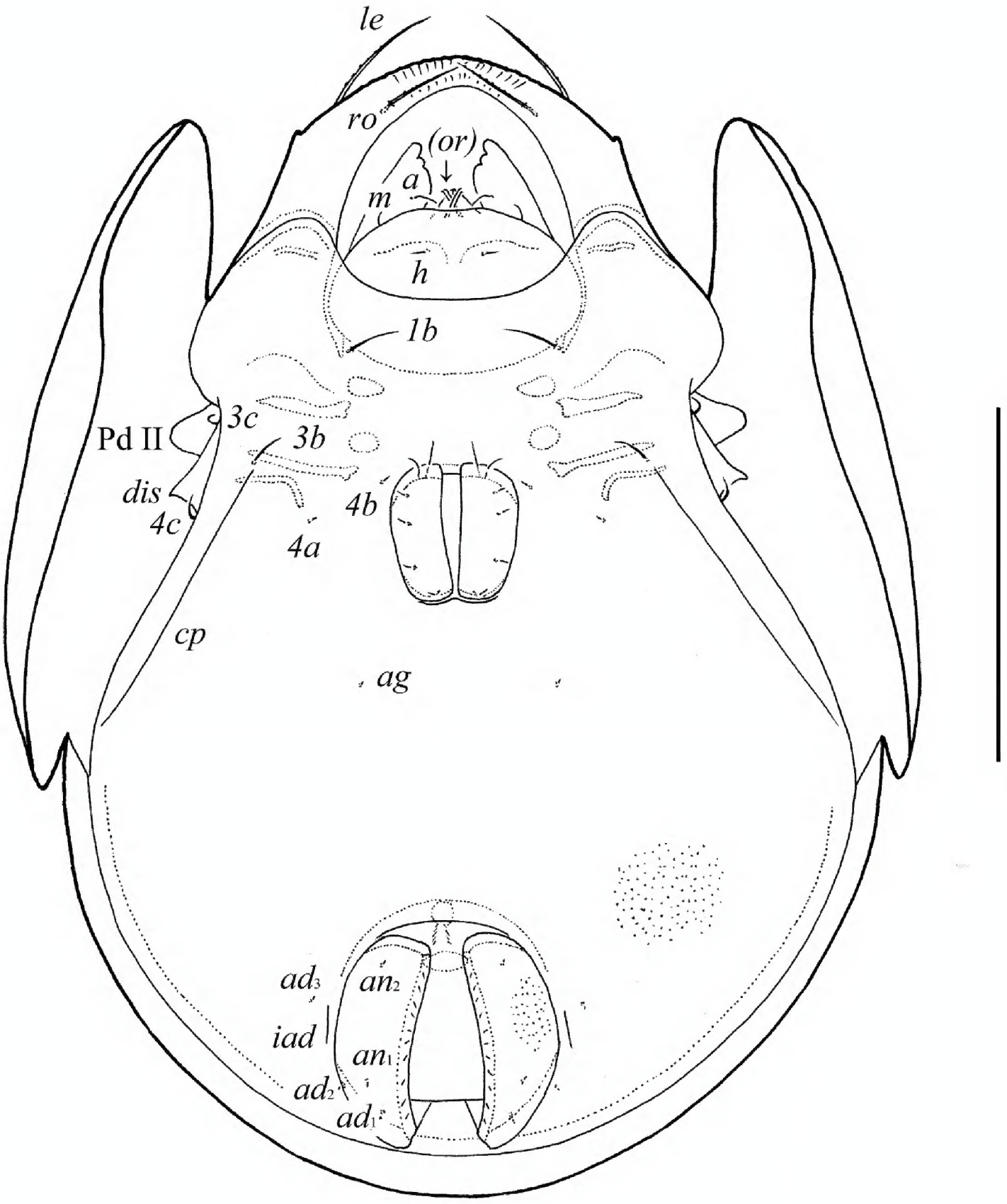
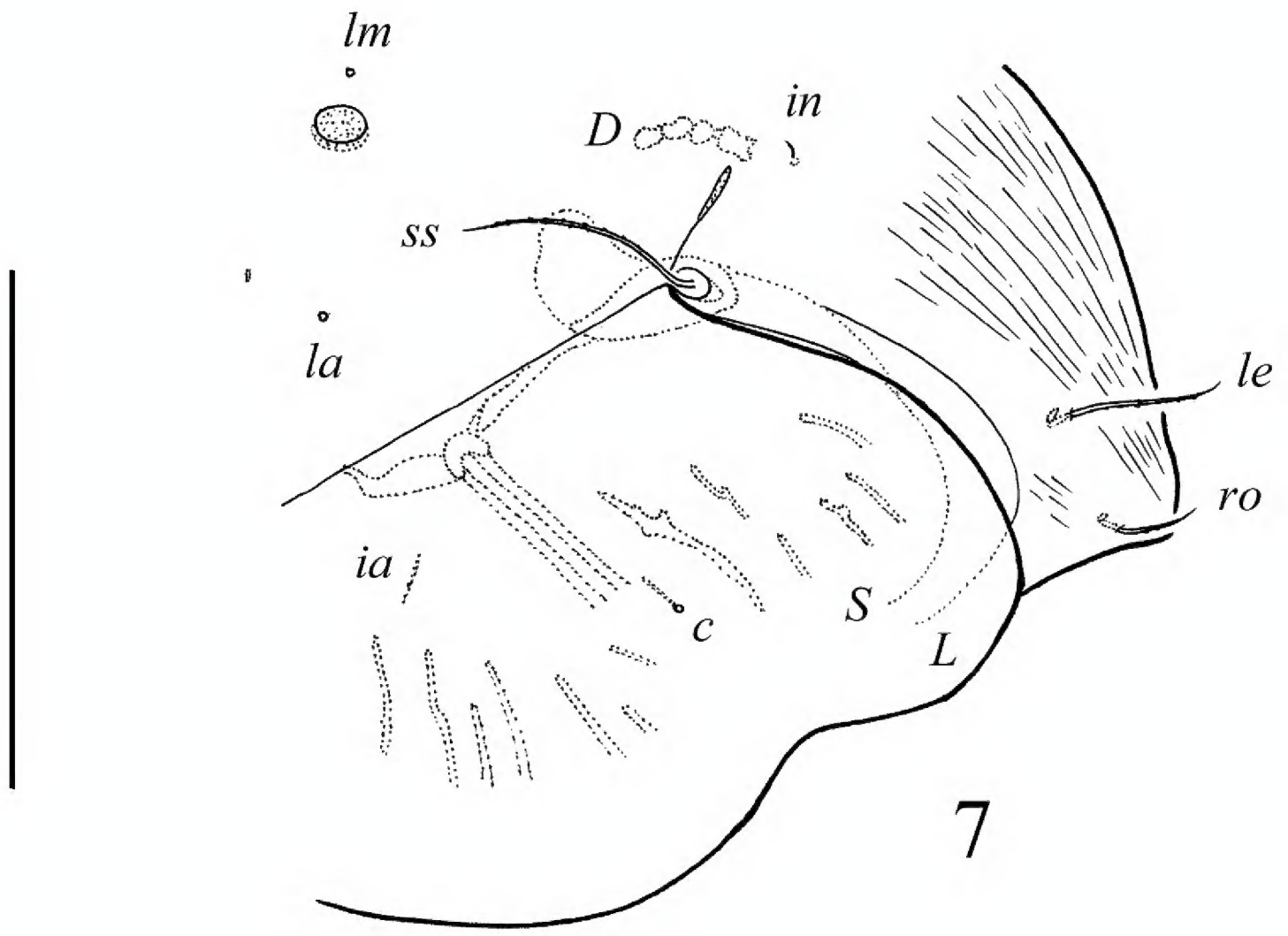
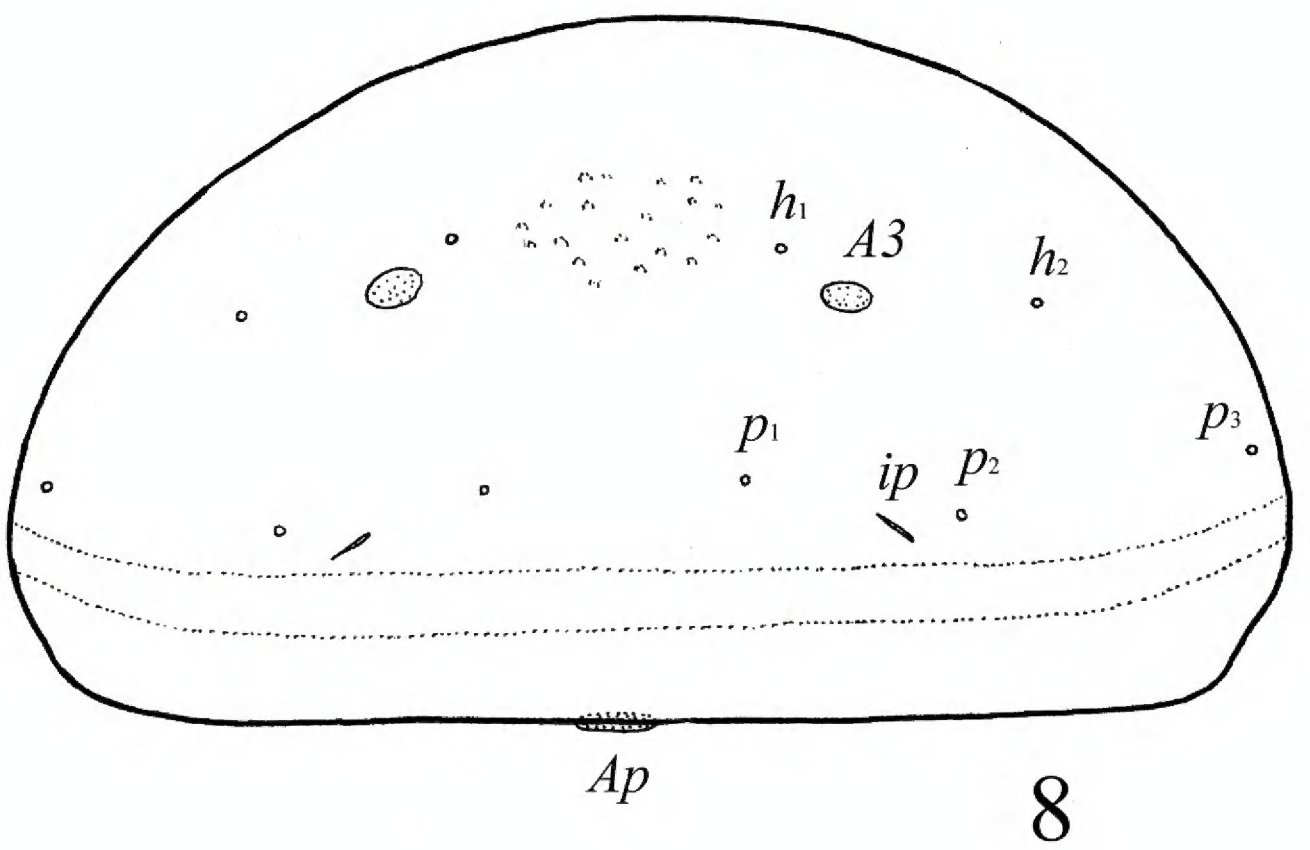


Figure 6. *Pergalumna striatiprodorsum* sp. n.: ventral view (legs not illustrated). Scale bar 200 μm.

(6–8) thin, smooth, shorter than *3b* (20–24) and *1b*, *3c*, *4c* (32–36), slightly barbed. Pedotecta II scale-like, rounded in ventral view. Discidia pointly triangular. Circumpedal carinae distinct, directed posterior of setae *3b*.

Anogenital region. Six pairs of genital (g_1, 16–18; g_2, 12–14; g_3–g_6, 8–10), one pair of aggenital (6–8), two pairs of anal (6–8) and three pairs of adanal (6–8) setae setiform, thin, smooth. Anterior parts of genital plates with two setae. Adanal setae ad_3 inserted laterally to lyrifissures *iad*. Postanal porose area present, elongate oval (20–28 × 6–8).





Figures 7–8. *Pergalumna striatiprodorsum* sp. n.: **7** dorso-lateral view of prodorsum and anterior part of notogaster and pteromorph (gnathosoma and legs not illustrated) **8** posterior view of notogaster. Scale bars 200 μm.

Legs. Morphology of leg segments, setae and solenidia typical for *Pergalumna* (see Engelbrecht 1972; Ermilov et al. 2010; Ermilov and Anichkin 2011). Formulae of leg setation and solenidia: I (1–4–3–4–20) [1–2–2], II (1–4–3–4–15) [1–1–2], III (1–2–1–3–15) [1–1–0], IV (1–2–2–3–12) [0–1–0]; homology of setae and solenidia indicated in Table 1.

Type deposition. The holotype is deposited in the Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia; seven paratypes are deposited in the collection of the Tyumen State University Museum of Zoology, Tyumen, Russia; one paratype is deposited in the collection of the Centro de Investigación en Estructuras, Microscópicas (CIEMIC), Ciudad de la Investigación, Universidad de Costa Rica, San José, Costa Rica.

Etymology. This specific name "*striatiprodorsum*" refers to the striate prodorsum.

Remarks. In having the striate prodorsum, setiform bothridial setae, absence of anterior notogastral margin and presence of three pairs of oval porose areas (*Aa* oval, rounded, located close to *lm*), *Pergalumna striatiprodorsum* sp. n. is most similar to *P. hawaiiensis hawaiiensis* (Jacot, 1934) from the Pacific Islands and *P. strigulata* Mahunka, 1978 from Mauritius. However, it differs from *P. hawaiiensis* by the short interlamellar setae (versus medium size in *P. hawaiiensis*) and striate prodorsum (versus only anterior part of prodorsum with stria in *P. hawaiiensis*); from *P. strigulata* by the absence of stria on notogaster (versus notogaster striate in *P. strigulata*), short interlamellar setae (versus medium size in *P. strigulata*) and barbed bothridial setae (versus smooth in *P. strigulata*).

Among Neotropical species *Pergalumna striatiprodorsum* sp. n. is most similar morphologically to *P. decorata* Balogh & Mahunka, 1977. However, it differs from the latter by the absence of anterior notogastral margin (versus anterior margin present in *P. decorata*), barbed bothridial setae (versus smooth in *P. decorata*), absence of stria on notogaster (versus notogaster striate in *P. decorata*) and microgranulate body surface and pteromorphs (versus with larger foveoles in *P. decorata*).

Key to known species of *Pergalumna* from the Neotropical region[1]

1 Bothridial setae with clear head **2**
– Bothridial setae setiform **13**
2 Anterior margin of notogaster developed **3**
– Anterior margin of notogaster not developed **9**
3 Surface of prodorsum with numerous longitudinal stria or rugae **4**

1 We did not include two Neotropical species, *Pergalumna obvia* (Berlese, 1914) and *P. curva ventralis* (Willmann, 1931) (sensu Subías 2004, updated 2014), in the key. We consider *Pergalumna obvia* as representative of the genus *Galumna* Heyden, 1826 without additional studying of the type material (see Ermilov et al. 2013b). *Pergalumna curva ventralis* has no lamellar lines (see Hammer 1958, 1961, 1972), therefore we consider this species as representative of the genus *Allogalumna* Grandjean, 1936 (see generic diagnosis for *Allogalumna* in Ermilov et al. 2013a).

– Surface of prodorsum without stria and rugae **5**

4 Surface of notogaster striate; interlamellar setae of medium size; notogaster with four pairs of porose areas (*A2* present); body length: 330–460 .... ***Pergalumna striata*** **(Pérez-Íñigo & Baggio, 1980)** (see also Pérez-Íñigo and Baggio 1994). Distribution: Brazil

– Surface of notogaster foveolate; interlamellar setae absent; notogaster with three pairs of porose areas (*A2* absent); body size: 486–527 × 405–437 .... ***Pergalumna complicata*** **Balogh & Mahunka, 1978** (see Fig. 23A–B, not Fig. 24A–E, in Balogh and Mahunka 1978). Distribution: Brazil

5 Centro-anterior part of notogaster with specific ornamentation (longitudinal line with lateral lineate branches); lamellar setae minute; notogastral porose areas *Aa* elongated transversally, very narrow; body size: 282–298 × 199–215 .... ***Pergalumna ornamenta*** **Ermilov, Starý, Sandmann, Marian & Maraun, 2013**. Distribution: Ecuador

– Centro-anterior part of notogaster without specific ornamentation; lamellar setae of medium size or long; notogastral porose areas *Aa* triangular, boot-shaped, rounded or oval **6**

6 Interlamellar setae long; notogastral porose areas *Aa* triangular or boot-shaped 7

– Interlamellar setae minute; notogastral porose areas *Aa* rounded or oval **8**

7 Median pore located posterior to the virtual line connecting porose areas *A2*; notogastral porose areas *A1* and *A2* small; lyrifissures *im* located between setal alveoli *lm* and *lp*; body length: 470–600 .... ***Pergalumna bryani bryani*** **(Jacot, 1934)** (see also Hammer 1973). Distribution: Pacific Islands and Galapagos Islands

– Median pore located little posterior to the virtual line connecting porose areas *A1*; notogastral porose areas *A1* and *A2* of medium size; lyrifissures *im* located laterally to *A1*; body size: 620 × 430 ..... ***Pergalumna comparanda*** **(Berlese, 1920)** (see also Mahunka 1992). Distribution: Argentina

8 Bothridial setae pointed distally; notogastral porose areas *A3* elongated, longer than *A1* and *A2*; body length: 820 .... ***Pergalumna andicola*** **Hammer, 1961**. Distribution: Peru

– Bothridial setae rounded distally; notogastral porose areas *A1*, *A2* and *A3* rounded, similar in size; body length: 730 .... ***Pergalumna anellata*** **Hammer, 1961**. Distribution: Peru

9 Interlamellar setae long **10**

– Interlamellar setae minute or represented by alveoli **11**

10 Bothridial head barbed medio-distally, stalk smooth; rostral setae inserted laterally; pteromorphal wrinkles indistinct; body size: 320–400 × 270 .... ***Pergalumna numerosa*** **(Sellnick, 1923)** (see also see also Pérez-Íñigo and Baggio 1994). Distribution: Brazil

– Bothridial head and stalk barbed; rostral setae inserted ventro-laterally; pteromorphal wrinkles clearly visible; body size: 338–392 × 258–320 ....***Pergalumna bellesii*** **Pérez-Íñigo & Baggio, 1997**. Distribution: Brazil

11 Basal part of prodorsum with longitudinal stria; notogaster with four pairs of porose areas; lamellar setae of medium size; body length: 600 ....***Pergalumna montana*** **Hammer, 1961**. Distribution: Peru and Venezuela

– Basal part of prodorsum without longitudinal stria; notogaster with three pairs of porose areas; lamellar setae short **12**

12 Notogastral porose areas *Aa* oval; median pore present; bothridial setae well barbed; body length: 492–576 ..... ***Pergalumna nasica*** **Pérez-Íñigo & Baggio, 1980**. Distribution: Brazil and Argentina

– Notogastral porose areas *Aa* triangular; bothridial setae indistinctly barbed; median pore absent; body length: 468 × 360 ..... ***Pergalumna cardosensis*** **Pérez-Íñigo & Baggio, 1986**. Distribution: Brazil and Peru

13 Anterior margin of notogaster developed **14**

– Anterior margin of notogaster not developed **17**

14 Surface of prodorsum and notogaster nearly smooth; body size: 520–676 × 502 ..... ***Pergalumna foveolata*** **Hammer, 1973** (see also Bayartogtokh and Chattarjee 2010). Distribution: Polynesia, India and Brazil

– Surface of prodorsum with longitudinal stria or large foveoles; surface of notogaster striate **15**

15 Surface of prodorsum with longitudinal stria; interlamellar setae minute; notogastral porose areas *Aa* located closer to setal alveoli *lm* than to *la*; body size: 637–653 × 469–494 ..... ***Pergalumna decorata*** **Balogh & Mahunka, 1977**. Distribution: Neotropical region

– Surface of prodorsum with large foveoles; interlamellar setae of medium size; notogastral porose areas *Aa* equal distanced from setal alveoli *la* and *lm* **16**

16 Rostrum pointed; anal plates striate; body size: 810–860 × 780–810 .... ***Pergalumna decoratissima*** **Pérez-Íñigo & Baggio, 1986**. Distribution: Neotropical region

– Rostrum rounded, with lateral tooth on each side; anal plates not striate; body size: 780–962 × 630–747 ..... ***Pergalumna paradecoratissima*** **Ermilov & Kalúz, 2012**. Distribution: Ecuador

17 Surface of prodorsum with three striate bands (one basal, transverse and two dorso-lateral, longitudinal striate bands) **18**

– Surface of prodorsum without three striate bands **19**

18 Rostrum pointed; posterior part of notogaster with striate bands; body size: 415–464 × 282–332 ..... ***Pergalumna boliviana*** **Ermilov, 2013** (see Ermilov and Niedbala 2013). Distribution: Bolivia

– Rostrum rounded; posterior part of notogaster without striate bands; body size: 278 × 213 ..... ***Pergalumna passimpunctata*** **Balogh & Mahunka, 1969** (see also Ermilov and Niedbała 2013). Distribution: Brazil

19 Surface of prodorsum with numerous longitudinal stria **20**

– Surface of prodorsum without stria **21**

20 Whole surface of prodorsum striate; interlamellar setae minute; notogastral porose areas *Aa* rounded; body size: 630–697 × 448–514 .... ***Pergalumna striatiprodorsum*** **sp. n**. Distribution: Costa Rica

– Only basal part of prodorsum striate; interlamellar setae of medium size; notogastral porose areas *Aa* elongated transversally; body length: 750 ....***Pergalumna magnipora magnipora*** **(Hammer, 1961)**. Distribution: Peru

21 Interlamellar setae of medium size or long **22**

– Interlamellar setae minute or represented by alveoli **30**

22 Rostrum tridentate; body size: 384 × 360 ..... ***Pergalumna plumata*** **Pérez-Íñigo & Baggio, 1986**. Distribution: Neotropical region

– Rostrum rounded **23**

23 Notogastral porose areas *A1* of specific structure **24**

– Notogastral porose areas *A1* rounded or oval **25**

24 Body surface microgranulate; notogastral porose areas *Aa* weakly triangular, *A1* long, band-shaped, specifically curving; body size: 332–352 × 246–266.. .....***Pergalumna elongatiporosa*** **sp. n.** Distribution: Costa Rica

– Body surface smooth; notogastral porose areas *Aa* elongate oval, *A1* with rounded anterior part (with distinct margins) and triangular posterior part (without distinct margins); body size: 448–498 × 315–348..... ***Pergalumna sura*** **P. Balogh, 1997** (see also Ermilov et al. 2014). Distribution: Neotropical region

25 Interlamellar setae longer than bothridial setae..... **26**

– Interlamellar setae shorter than bothridial setae **27**

26 Adanal setae of medium size, ad_3 inserted posteriorly to lyrifissures *iad*; surface of prodorsum with small tubercles; body size: 1062–1261 × 713–863 ..... . ***Pergalumna paralongisetosa*** **Ermilov & Kalúz, 2012**. Distribution: Ecuador

– Adanal setae minute, ad_3 inserted laterally to lyrifissures *iad*; surface of prodorsum without tubercles; body size: 697–713 × 498–506 .... ***Pergalumna ecuadorensis*** **Ermilov & Kalúz, 2012**. Distribution: Ecuador

27 Notogastral porose areas *A1* clearly larger than other porose areas; body length: 400 .... ***Pergalumna melloi*** **Pérez-Íñigo & Baggio, 1994**. Distribution: Brazil

– Notogastral porose areas *A1* not larger than other porose areas **28**

28 Two pairs of notogastral porose areas (*A1*, *A2*) observed, *A1* very narrowly band-shaped; body size: 394–410 × 295..... ***Pergalumna horvathorum*** **P. Balogh, 1997**. Distribution: Neotropical region

– Three or four pairs of notogastral porose areas observed, *A1* rounded or oval...**29**

29 Three pairs of notogastral porose areas (*A3* not observed) present; median pore absent; body size: 390–420 × 342–360 .... ***Pergalumna pauliensis*** **Pérez-Íñigo & Baggio, 1991**. Distribution: Brazil

– Four pairs of notogastral porose areas (including *A3*) present; median pore present; body size: 410–490 × 315–365..... ...***Pergalumna aequalis*** **(Sellnick, 1923)**. Distribution: Neotropical region

30 Notogastral porose areas *Aa* rounded **31**

– Notogastral porose areas *Aa* elongated transversally **32**

31 Rostrum pointed; notogastral porose areas *A1* and *A3* oval or rounded; body length: 620 ..... ***Pergalumna bifissurata*** **Hammer, 1972**. Distribution: Polynesia and Galapagos Islands

– Rostrum rounded; notogastral porose areas *A1* and *A3* elongated; body length: 500–540 ..... ***Pergalumna australis*** **Pérez-Íñigo & Baggio, 1980**. Distribution: Brazil and Ecuador

32 Four pairs of notogastral porose areas present; interlamellar setae represented by alveoli; body size: 276–348 × 228–300 .... ***Pergalumna parva*** **Pérez-Íñigo & Baggio, 1986**. Distribution: Brazil

– Three pairs of notogastral porose areas present (*A2* absent); interlamellar setae represented by microsetae **33**

33 Lamellar setae longer than rostral setae; surface of anterior part of prodorsum granulate; body size: 863–1000 × 680–697 ..... ***Pergalumna silvatica*** **Hammer, 1961** (see also Ermilov et al. 2014). Distribution: Neotropical region

– Lamellar setae shorter than rostral setae; surface of prodorsum not granulate; body size: 468 × 408 ....***Pergalumna aegra*** **Pérez-Íñigo & Baggio, 1986**. Distribution: Brazil

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References

Balogh J, Balogh P (2002) Identification keys to the oribatid mites of the Extra-Holarctic regions. Vol. 1, Well-Press Publishing Limited, Miskolc, 453 pp.

Balogh J, Mahunka S (1969) The scientific results of the Hungarian soil zoological expeditions to South America. 10. Acari: Oribatids, collected by the second expedition. I. Acta Zoologica Academiae Scientiarum Hungaricae 15(1/2): 1–21.

Balogh J, Mahunka S (1977) New data to the knowledge of the oribatid fauna of Neogea (Acari). I. Acta Zoologica Academiae Scientiarum Hungaricae 23(1/2): 1–28.

Balogh J, Mahunka S (1978) New data to the knowledge of the oribatid fauna of the Neogea (Acari). III. Acta Zoologica Academiae Scientiarum Hungaricae 24(3/4): 269–299.

Balogh P (1997) New species of oribatids (Acari) from the Neotropical region. Opuscula Zoologica (Budapest) 29/30: 21–30.

Bayartogtokh B, Chatterjee T (2010) Oribatid mites from marine littoral and freshwater habitats in India with remarks on world species of *Thalassozetes* (Acari: Oribatida). Zoological Studies 49(6): 839–854.

Berlese A (1914) Acari nuovi. Manipulus IX. Redia 10: 113–150.

Berlese A (1920) Centeria quinta di acari nuovi. Redia 14: 143–195.

Engelbrecht CM (1972) Galumnids from South Africa (Galumnidae, Oribatei). Acarologia 14(1): 109–140.

Ermilov SG, Alvarado-Rodríguez O, Retana-Salazar AP (2014) Contribution to the knowledge of Costa Rican oribatid mite fauna, with supplementary descriptions of *Pergalumna silvatica* and *P. sura* (Acari: Oribatida Galumnidae). Systematic & Applied Acarology 19(2): 216–222.

Ermilov SG, Anichkin AE (2011) New oribatid mites of the genera *Pergalumna* and *Galumnella* (Acari, Oribatida, Galumnoidea) from Vietnam. Acarina 19(2): 242–251.

Ermilov SG, Kalúz S (2012) Four new species of the superfamily Galumnoidea (Acari: Oribatida) from Ecuador. Zootaxa 3481: 27–38.

Ermilov SG, Niedbała W (2013) Contribution to the knowledge of the oribatid mite fauna of Bolivia, Zambia, Cambodia and Vietnam, with descriptions of two new species (Acari: Oribatida). Spixiana 36(1): 9–19.

Ermilov SG, Sidorchuk EA, Rybalov LB (2010) A new species of the genus *Pergalumna* (Acari: Oribatida: Galumnidae) collected in moss on trees from Ethiopia. Systematic & Applied Acarology 15(3): 244–250.

Ermilov SG, Starý J, Sandmann D, Marian F, Maraun M (2013a) New taxa and new records of oribatid mites of the family Galumnidae (Acari: Oribatida) from Ecuador. Zootaxa 3700(2): 259–270. doi: 10.11646/zootaxa.3700.2.4

Ermilov SG, Weigmann G, Tolstikov AV (2013b) Morphology of adult and juvenile instars of *Galumna obvia* (Acari, Oribatida, Galumnidae), with discussion of its taxonomic status. ZooKeys 357: 11–28. doi: 10.3897/zookeys.357.6404

Grandjean F (1936) Les Oribates de Jean Frédéric Hermann et de son père. Ann. Soc. Ent. France 105: 27–110.

Hammer M (1958) Investigations on the oribatid fauna of the Andes Mountains. I. The Argentine and Bolivia. Kongelige Danske Videnskabernes Selskab Biologiske Skr. 10(1): 1–129.

Hammer M (1961) Investigations on the oribatid fauna of the Andes Mountains. II. Peru. Kongelige Danske Videnskabernes Selskab Biologiske Skr. 13(1): 1–157.

Hammer M (1972) Investigations on the oribatid fauna of Tahiti, and some oribatids found on the Atoll Rangiroa. Kongelige Danske Videnskabernes Selskab Biologiske Skr. 19(3): 1–66.

Hammer M (1973) Oribatids from Tongatapu and Eua, the Tonga Islands, and from Upolu, Western Samoa. Kongelige Danske Videnskabernes Selskab Biologiske Skr. 20(3): 1–70.

Heyden C (1826) Versuch einer sistematischen Eintheilund der Acariden. Isis (Oken) 1(4): 607–613.

Jacot AP (1934) Some Hawaiian Oribatoidea (Acarina). Bernice P. Bishop Museum Bulletin (Honolulu) 121: 1–99.

Mahunka S (1978) Neue und interessante milben aus dem Genfer museum XXXIV. A compendium of the oribatid (Acari) fauna of Mauritius, Reunion and the Seychelles Is. II. Revue suisse de Zoologie 85(2): 307–340.

Mahunka S (1992) "Pelops" and "Oribates" species in the Berlese-collection (Acari). Acta Zoologica Academiae Scientiarum Hungaricae 38(3/4): 213–260.

Norton RA, Behan-Pelletier VM (2009) Oribatida. In: Krantz GW, Walter DE (Eds) A Manual of Acarology. Chapter 15. Texas Tech University Press, Lubbock, 430–564.

Pérez-Íñigo C, Baggio D (1980) Oribátidos edáficos do Brasil. I. Bol. Zool. Univ. São Paulo, 5: 111–147.

Pérez-Íñigo C, Baggio D (1986) Oribates édaphiques du Brésil (III). Oribates de l'Île de "Cardoso" (deuxième partie). Acarologia 27(2): 163–179.

Pérez-Íñigo C, Baggio D (1991) Oribates édaphiques du Brésil (VI). Oribates de l'État de Sâo Paulo (troisième partie). Acarologia 32(1): 79–92.

Pérez-Íñigo C, Baggio D (1994) Oribates édaphiques du Brésil (VIII). Oribates de l'état de São Paulo (Cinquieme partie). Acarologia 35(2): 181–198.

Pérez-Íñigo C, Baggio D (1997) Oribates édaphiques du Brésil (X). Quelques Oribates de l'état de para. Acarologia 38(4): 403–413.

Schatz H (2006) Catalogue of known oribatid mite species (Acari Oribatida) from the Central American landbridge (First part). Tropical Zoology 19: 209–288.

Schatz H (2007) Biogeography of oribatid mites (Acari, Oribatida) from the Cordillera de Talamanca, Costa Rica and Panama. In: Morales-Malacara JB, Behan-Pelletier VM, Ueckermann E, Pérez TM, Estrada-Venegas EG, Badil M (Eds) Acarology XI: Proc. Int. Cong. Ins. Biol. Fac. Ciencias, Univ. Nac. Autónom. México. Sociedad Latinoamericana de Acarología, México, 151–167.

Sellnick M (1923) Oribatideos Brasilieros, I. Galumnidae. Arquivos do Museu Nacional 24: 303–320.

Subías LS (2004) Listado sistemático, sinonímico y biogeográfico de los ácaros oribátidos (Acariformes: Oribatida) del mundo (excepto fósiles). Graellsia, 60 (número extraordinario): 3–305. [Actualized electronic version in May 2014, 577 pp.]

Willmann C (1931) Oribatei (Acari), gesammelt von der deutschen limnologischen sunda-expedition. Archiv fur Hydrobiologie (Suppl. 9) 2: 240–305.